

In situ Polymerization and Properties of Biobased Polyurethane/Epoxy Interpenetrating Network Nanocomposites

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Abstract : Polyurethane networks based on castor oil (CO) as a renewable resource polyol were synthesized. Polyurethane/epoxy resin interpenetrating network nanocomposites containing modified montmorillonite organoclay (C30B-PU/EP nanocomposites) were prepared by an in situ intercalation method. The conventional spectroscopic characterization of the synthesized samples using FT-IR confirms the existence of the proposed castor oil based PU structure and also showed that strong interactions existed between C30B and EP/PU matrix. The dispersion degree of C30B in EP/PU matrix was characterized by X-Ray diffraction (XRD) method. Scanning electronic microscopy analysis showed that the interpenetrating process of PU and EP increases the exfoliation degree of C30B, and it improves the compatibility and the phase structure of polyurethane/epoxy resin interpenetrating polymer networks (PU/EP IPNs). The thermal stability improves compared to the polyurethane when the PU/EP IPN is formed. Mechanical properties including the Young's modulus and tensile strength reflected marked improvement with addition of C30B.

Keywords : castor oil, epoxy, montmorillonite, polyurethane

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